

REMARKS

The abstract and specification have been extensively amended in order to correct grammatical and idiomatic errors contained therein. No new matter has been added.

In order to expedite the prosecution of the present application and respond to the Examiner's rejection of Claims 1-4 under 35 USC 112, second paragraph, Claim 1 has been canceled and replaced by newly presented Claim 9 which more particularly points out and distinctly claims the subject matter which Applicant regards as the invention. Newly presented Claims 10 and 11 are directed to preferred embodiments of the present invention. No new matter has been added. It is respectfully submitted that the currently presented claims clearly comply with the requirements of 35 USC 112.

Claims 1-4 have been rejected under 35 USC 103(a) as being unpatentable over either Applicant's admitted prior art or JP 2000-036370A and further in view of JP 355165288A and further in view of JP404224628A. Applicant respectfully traverses this ground of rejection and urges reconsideration in light of the following comments.

The presently claimed invention is directed to an electron bombardment heating apparatus for heating a material. The apparatus comprises a filament for emitting thermions therefrom, means for accelerating the thermions emitted from the filament towards the heating plate, a heating plate which is heated by bombardment of the accelerated thermions and serves as a means for supporting the material to be heated and a supporting member having the heating plate provided at a top portion thereof, vertically disposed cylindrical peripheral wall portions which have a different diameter from each other and a horizontally disposed annular wall portion which extends in the radial direction and connects the vertically disposed cylindrical peripheral wall portions with each other.

As discussed in the present specification, it is known to provide electron bombardment heating apparatuses in which accelerated electrons strike or impinge upon the rear surface of a heating plate, thereby generating heat thereon so that the heating plate serves as a means for heating up a plate-like material, such as a semiconductor wafer, placed thereon. However, in these apparatuses, a heated material supporting member is typically made of heat-resistant silicon carbide impregnated with silicon or a ceramic and therefore is subject to thermal stress. When beginning the heating of the heating plate, the heating plate undergoes thermal expansion which causes the heated material supporting member to deform and concentrate thermal stress on a shoulder portion. During the repetition of the heating and cooling of the heating plate, the heated material supporting member repeatedly undergoes thermal stress and, eventually fatigues and deteriorates, resulting in the breakage thereof. The present invention was arrived at in order to overcome this problem. That is, the present invention is based on the discovery that when a supporting member is used which comprises vertically disposed cylindrical peripheral wall portions having different radiuses, thermal stresses caused due to a difference in temperature between the heated plate and a lower portion thereof can be mitigated. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

Applicant's admitted prior art and JP 2000-036370A discloses an electron bombardment heating apparatus in which a flat heating plate is heated by accelerated thermions from a filament to heat a thin-flat object. However, the prior art has no disclosure with respect to varying the diameter of peripheral wall portions of a supporting member in order to mitigate the effects of thermal stress. Therefore, in order to present a proper showing of prima facie obviousness under 35 USC 103(a), the secondary references cited by the Examiner must provide the motivation to one of ordinary skill in the

art to make such a modification to the primary references. It is respectfully submitted that the secondary references contain no such teachings.

JP 355165288A discloses an ion beam device in which an inert gas is discharged and ionized between an anode chamber and a cathode chamber to generate a plasma and the ions are drawn out in beam form by an accelerator to impinge upon a metal mold. Although this reference does disclose a chamber having peripheral wall portions with two different diameters, the operation of the ion beam device of this reference and the electron bombardment heating devices of the previously discussed references are so different that for the purposes of the Examiner, they are directed to non-analogous art. There is no heating plate in JP 355165288A that thermions impinge upon so the problem of thermal stress arising in the peripheral wall portions of a supporting member joined to the heating plate does not occur in this reference. In JP 355165288A, a mold at a lower portion of a chamber is struck by ion beams as opposed to a heating plate attached to peripheral wall portions being struck by thermions as is required in the present invention and the previously discussed prior art. As such, Applicant respectfully submits that only hindsight provided by the instant disclosure is motivating the Examiner to combine JP 355165288A with the primary references and that, in the present situation, such a combination is improper.

JP 404224628A has been cited by the Examiner as disclosing the use of a shielding body to prolong an electron beam irradiation apparatus' service life. However, like the previously discussed secondary reference, this reference has no disclosure that is considered pertinent with respect to the presently claimed invention in which a heating plate connected to peripheral wall portions is heated by thermions to heat a workpiece contained thereon. Therefore, Applicants respectfully submit that the presently claimed invention is

clearly patentably distinguishable over the prior art cited by the Examiner.

The Examiner is respectfully requested to reconsider the present application and to pass it to issue.

Respectfully submitted,


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